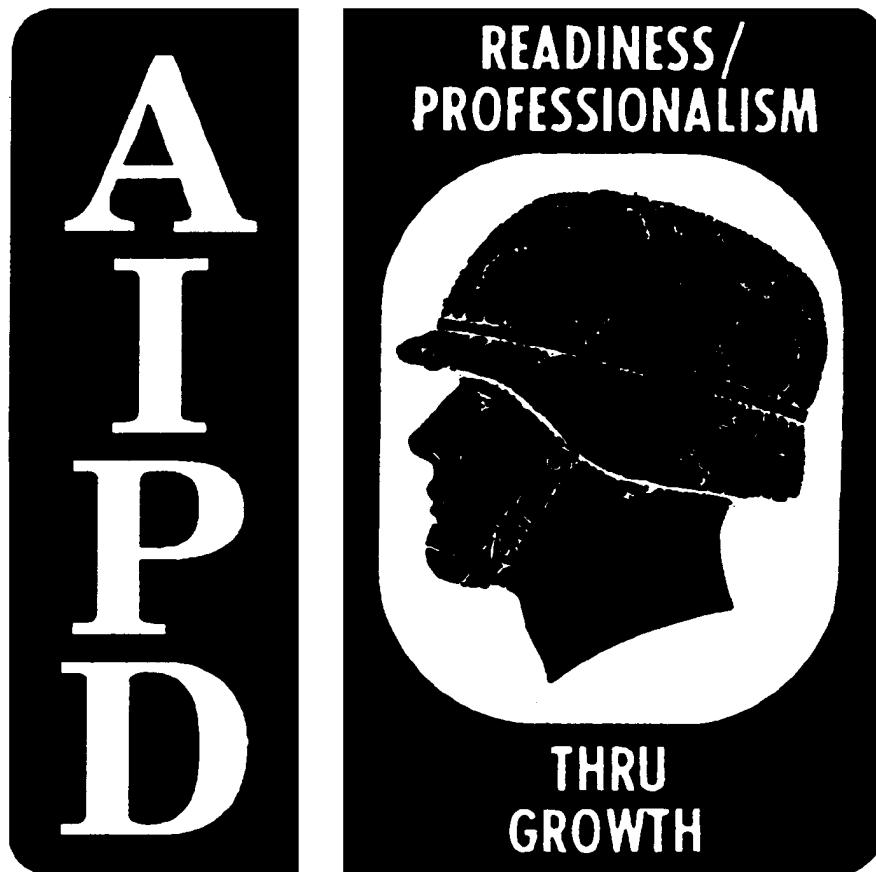


**SUBCOURSE  
EN5155**

**EDITION  
A**

---

**US ARMY ENGINEER SCHOOL  
CLEAR WASTE SYSTEM STOPPAGES  
PLUMBING VI**



---

**THE ARMY INSTITUTE FOR PROFESSIONAL DEVELOPMENT  
ARMY CORRESPONDENCE COURSE PROGRAM**

---

US ARMY PLUMBER  
MOS SKILL LEVELS 1 and 2 COURSE

CLEAR WASTE  
SYSTEM STOPPAGES

SUBCOURSE NO. EN5115

US Army Engineer School  
Fort Leonard Wood, Missouri

Seven Credit Hours

**GENERAL**

The Clear Waste System Stoppages subcourse, part of the MOS 51K Skill Levels 1 and 2 course, is designed to teach the knowledge necessary for performing tasks related to clearing stoppages in plumbing fixtures and waste drain lines. The subcourse is presented in two lessons, each corresponding to a terminal objective as indicated below.

**Lesson 1**  
**CLEAR STOPPAGES IN PLUMBING FIXTURES**

**OBJECTIVE:** Describe the procedures used to clear stoppages in plumbing fixtures.

**TASK:** 051-248-1012, Clear waste system stoppages.

**CONDITIONS:** You will be given subcourse booklet. You will work at your own pace and in your own selected environment with no supervision.

**STANDARDS:** Within approximately 4 hours, you should be able to study the lesson resources, answer the review exercises, and select the correct response to each examination question. You must respond correctly to 70 percent of the examination questions in order to receive credit for this subcourse.

**Lesson 2**  
**CLEAR STOPPAGES IN WASTE LINES**

**OBJECTIVE:** Describe the procedures used to clear stoppages in floor drains and buildings' main waste drains.

**TASK:** 051-248-1012, Clear waste system stoppages.

**CONDITIONS:** You will be given subcourse booklet. You will work at your own pace and in your own selected environment with no supervision.

**STANDARDS:** Within approximately 3 hours, you should be able to study the lesson resources, answer the review exercises, and select the correct response to each examination question. You must respond correctly to 70 percent of the examination questions in order to receive credit for this subcourse.

## TABLE OF CONTENTS

	Page
ADMINISTRATIVE INSTRUCTIONS .....	iv
GRADING AND CERTIFICATION INSTRUCTIONS .....	iv
INTRODUCTION .....	iv
Lesson 1: CLEAR STOPPAGES IN PLUMBING FIXTURES .....	1
Learning Event 1: Identifying Clearing Tools .....	2
Learning Event 2: Clearing Stoppages in Fixtures .....	3
Review Exercise .....	14
Review Exercise Solutions .....	16
Lesson 2: CLEAR STOPPAGES IN WASTE LINES .....	17
Learning Event 1: Identifying Sewer Snakes .....	18
Learning Event 2: Locating and Clearing Stoppages in Waste lanes .....	19
Review Exercise .....	24
Review Exercise Solutions .....	26
EXAMINATION .....	E-1
STUDENT INQUIRY SHEET (Administrative) .....	Following Examination
STUDENT INQUIRY SHEET (Subcourse Content) .....	Following Examination

## **INTRODUCTION**

A plumber's most common and frustrating problem is to locate and clear a stoppage in a plumbing drain waste system. A stoppage can happen anywhere in the system; in a fixture, branch line, or main line. A stoppage can be caused by hair, grease, and other foreign matter that holds back or blocks the flow of waste disposal in any part of a plumbing's drain waste system. You, as a plumber, must be able to locate and clear any stoppage using the proper plumbing tools.

**Lesson 1**  
**CLEAR STOPPAGES IN PLUMBING FIXTURES**

**OBJECTIVE**

At the end of this lesson, you will be able describe procedures to clear stoppages in plumbing fixtures.

**TASK**

051-248-1012, Clear waste system stoppages.

**CONDITIONS**

You will be given subcourse booklet. You will work at your own pace and in your own selected environment with no supervision.

**STANDARDS**

Within approximately 4 hours, you should be able to study the lesson resources, answer the review exercises, and select the correct response to each examination question. You must respond correctly to 70 percent of the examination questions in order to receive credit for this subcourse.

**REFERENCES**

FM 5-51K1/2

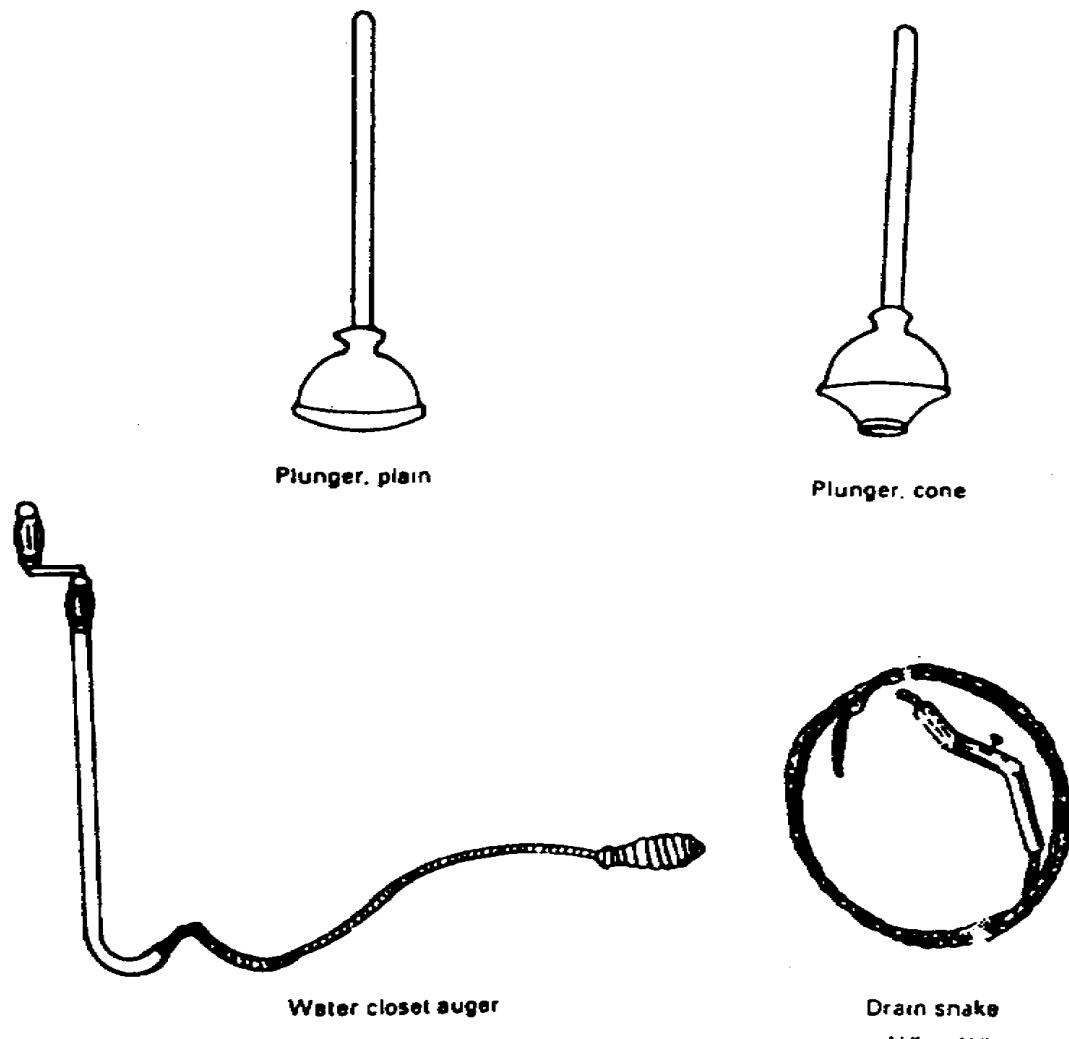
TM 5-551K

Lesson 1

**Learning Event 1:**  
**IDENTIFYING CLEARING TOOLS**

Fixture stoppages usually occur in the fixture's trap causing the waste disposal to overflow. The stoppage has to be located and cleared using the proper plumbing tool or tools. Stoppage clearing tools for fixtures are shown in figure 1.

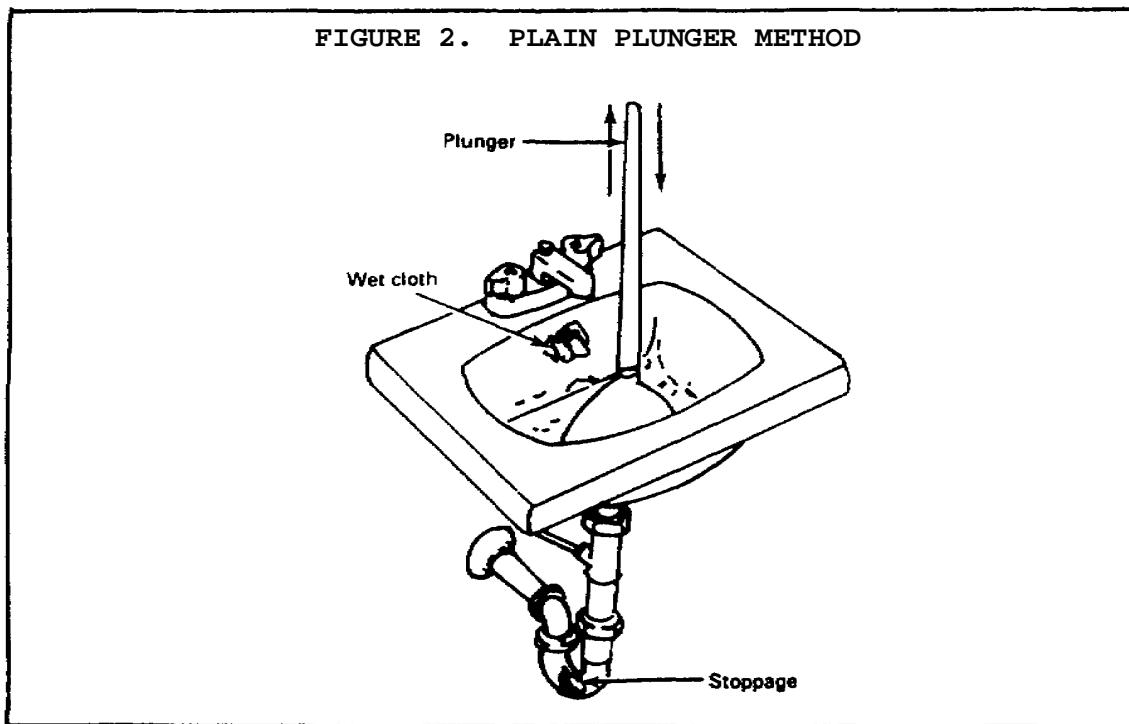
FIGURE 1. CLEARING TOOLS



**Learning Event 2:**  
**CLEARING STOPPAGES IN FIXTURES**

There are several methods you can use to clear stoppages. All of the methods take time and require a certain procedure to accomplish the job.

**Clearing a lavatory stoppage (plain plunger).** (See figure 2.)



Before using a plain plunger to clear a stoppage, place a wet cloth in the overflow opening.

Now remove the stopper or set it in a fully open position.

Place the plunger over the drain opening and push it up and down several times.

Then, lift plunger off the drain opening.

If the water in the bowl flows down the drain, the stoppage is cleared.

Turn on the water to double check that the stoppage is cleared.

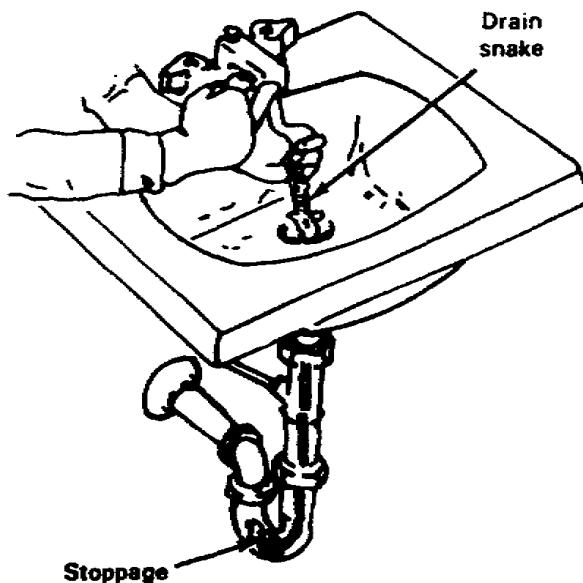
If the stoppage is cleared, replace or reset the stopper.

If the stoppage is not cleared, use a drain snake.

Lesson 1/Learning Event 2

Clearing a lavatory stoppage (drain snake). (See figures 3 and 4.)

FIGURE 3. DRAIN SNAKE METHOD-DRAIN OPENING



To clear a stoppage with a drain snake, remove the stopper.

Push the snake into the drain opening until it meets resistance.

Turning the handle in one direction only, push and pull the snake until it moves freely in drain.

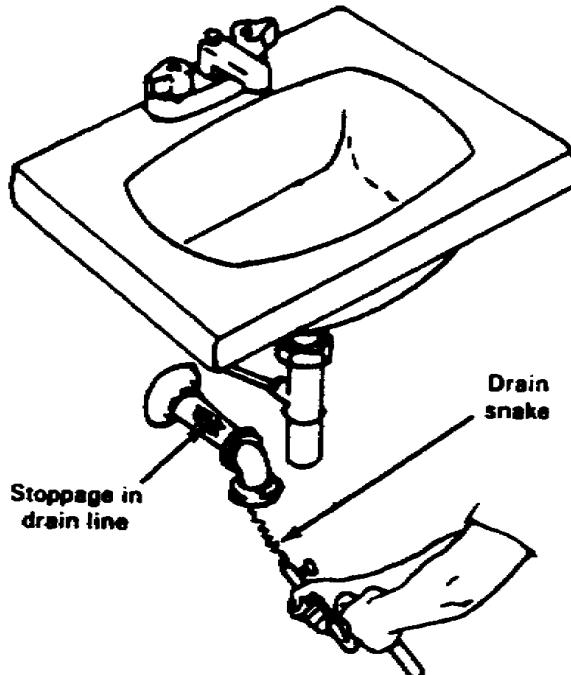
Then run water into the drain opening.

If it flows freely down the drain, the stoppage is cleared.

Remove the snake and replace the stopper.

Clearing a lavatory drain line. (See figure 4.)

FIGURE 4. DRAIN SNAKE METHOD-DRAIN LINE



If the stoppage is not in the trap but in the lavatory's drain line, remove the trap.

Now push the drain snake into the drain line.

Turn the handle in one direction only. Push and pull the snake until it moves freely.

Remove the snake and replace the trap.

Run water into the drain to make certain that the stoppage is cleared.

**NOTE:**

1. If the stoppage cannot be cleared, the stoppage is in the building's drainage system.
2. Sink stoppages are cleared in the same manner as lavatory stoppages.

## Lesson 1/Laming Event 2

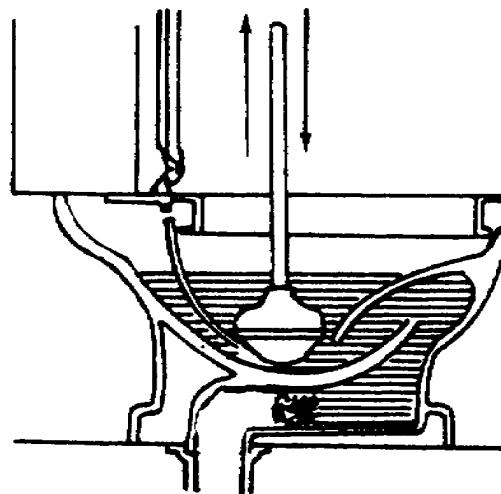
### SELF-CHECK EXERCISE

Fill in the blanks with your responses. Answers are provided on page 8.

1. The two types of plungers are \_\_\_\_\_ and \_\_\_\_\_.
2. When you remove a lavatory's stoppage with a plunger, a wet cloth is placed in the \_\_\_\_\_.
3. When you remove a lavatory's stoppage with a drain snake, the handle is turned in one \_\_\_\_\_ only.
4. What has to be removed if a lavatory's stoppage is in its drain line?
  - A. Stopper
  - B. Tailpiece
  - C. Trap
  - D. Strainer

Clearing a water closet stoppage (cone plunger). (See figure 5.)

FIGURE 5. CONE PLUNGER METHOD



A stoppage can be removed from a water closet with a cone-type plunger.

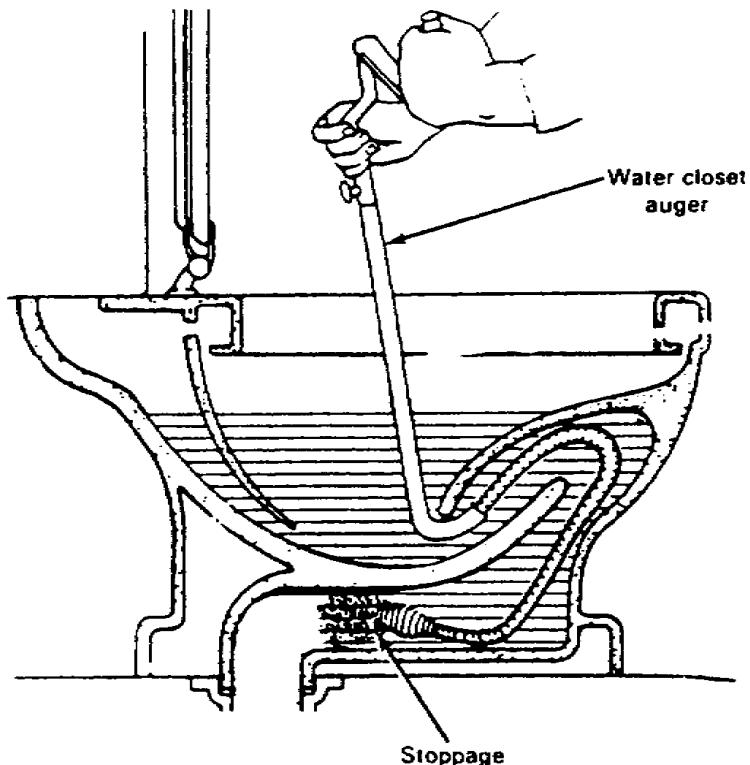
Place the plunger over the trap and push it up and down often until the water level returns to normal.

Throw a piece of toilet paper in the bowl and flush the water closet to assure that the stoppage is cleared.

**NOTE:** If a plunger cannot clear the stoppage, use a water closet auger.

Clearing a water closet stoppage (auger). (See figure 6.)

FIGURE 6. AUGER METHOD



To remove a stoppage using a water closet auger, push the auger into the water closet's trap until it meets resistance.

Turn the auger clockwise as you push and pull until the stoppage is cleared.

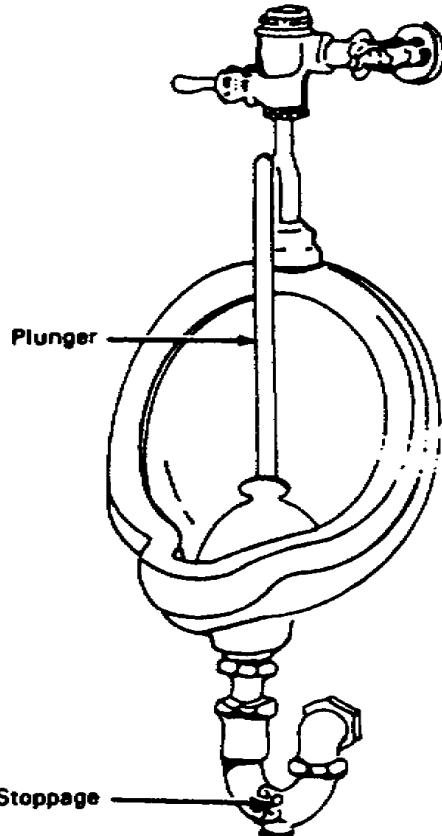
Remove the auger by turning it counterclockwise.

Throw a piece of toilet paper in the bowl and flush the water closet to assure that the stoppage is cleared.

Lesson 1/Learning Event 2

Clearing a urinal stoppage (P-trap). (See figure 7.)

FIGURE 7. CLEARING A P-TRAP URINAL



A urinal with an exposed P-trap that has a stoppage is cleared in the same manner as a lavatory. Use a plain plunger first, then the drain snake.

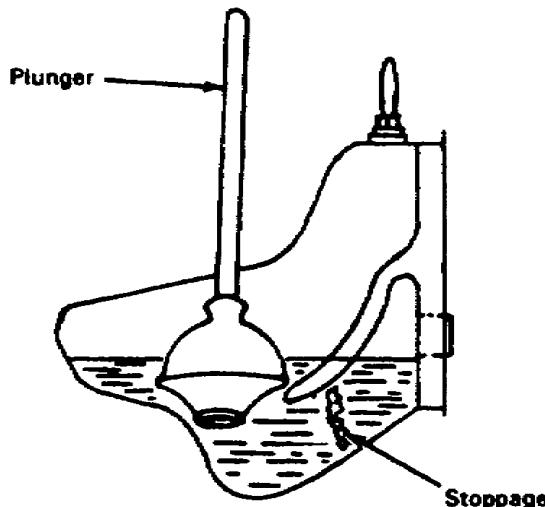
---

SELF-CHECK EXERCISE SOLUTIONS

1. Plain and Cone
2. Overflow opening
3. Direction
4. Trap

Clearing a urinal stoppage (seal trap). (See figure 8.)

FIGURE 8. CLEARING A SEAL TRAP URINAL



A urinal with a seal trap that has a stoppage is cleared by using a cone plunger first. Then use the drain snake that has a rounded end or the water closet auger.

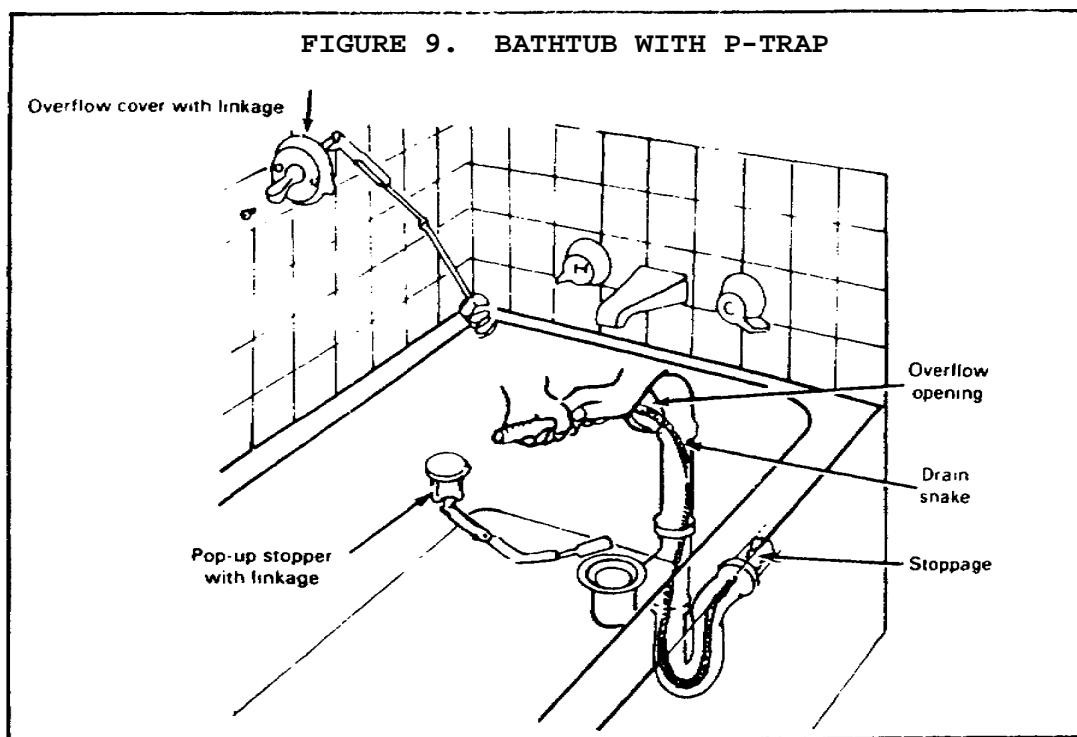
#### SELF-CHECK EXERCISE

Fill in the blanks with your responses. Answers are provided on page 10.

1. When you remove a water closet's stoppage in a P-trap, a \_\_\_\_\_ plunger is used.
2. A water closet's stoppage can also be removed with a \_\_\_\_\_.
3. A urinal's stoppage can be removed using a \_\_\_\_\_ or a \_\_\_\_\_.

## Lesson 1/Learning Event 2

Clearing a bathtub stoppage (P-trap). (See figure 9.)



Remove the pop-up stopper with its linkage.

Unscrew the overflow cover and pull it out with its linkage.

Push the snake down into the overflow opening until it meets resistance.

Turn the snake handle clockwise pushing the snake until it turns freely. The stoppage is cleared. Remove the snake from overflow opening.

Turn on the water to check that the stoppage has been cleared.

Replace the overflow cover.

Replace the pop-up stopper.

Make sure the pop-up stopper works properly after replacement

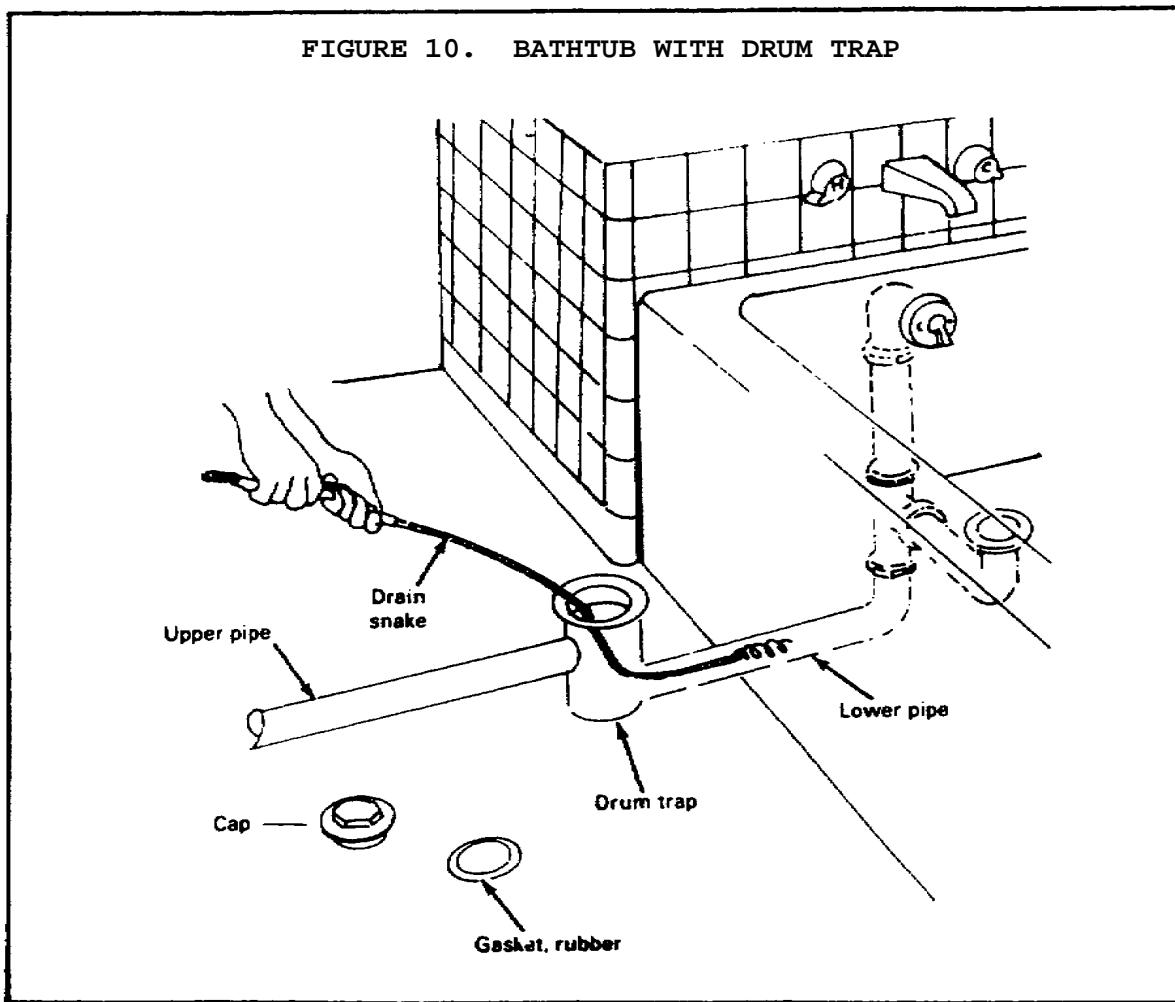
---

### SELF-CHECK EXERCISE SOLUTIONS

1. Cone
2. Closet auger
3. Plunger or a drain snake

Lesson 1/Leaning Event 2

Clearing a bathtub stoppage (drum trap). (See figure 10.)



Remove the drum trap cover with a wrench.

Remove the gasket from the trap.

Push a snake into the trap's lower pipe to search for the stoppage. If a stoppage exists, clear the stoppage.

If there is no stoppage in the lower pipe, remove the snake.

Push the snake into the trap's upper pipe and operate the snake to remove the stoppage.

Replace the gasket if the gasket is worn or damaged.

Screw the cover on hand tight and tighten it with a wrench. Turn on the water to check that the stoppage has been cleared.

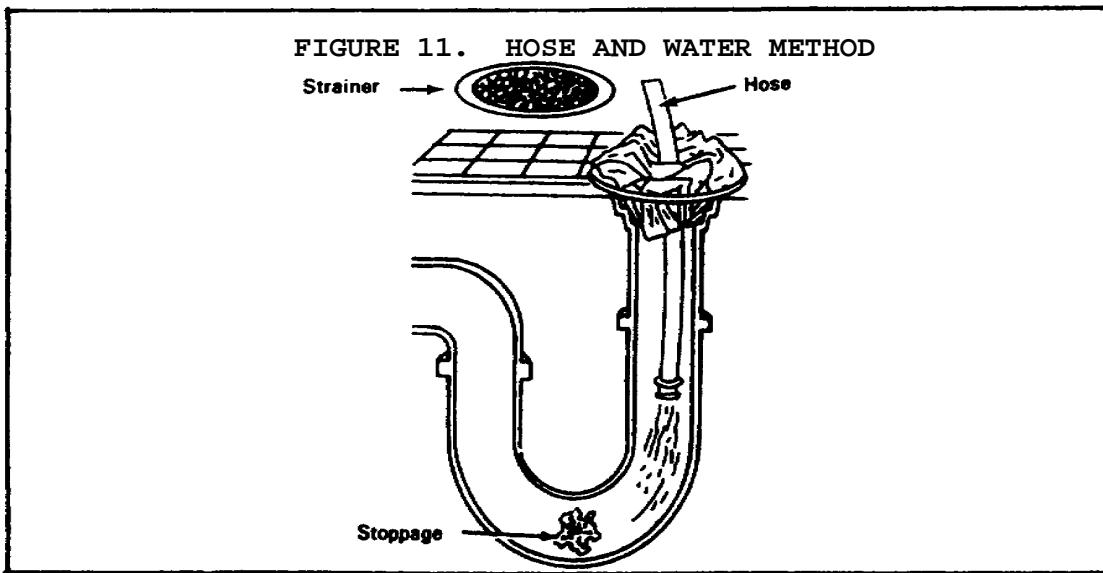
## Lesson 1/Learning Event 2

### SELF-CHECK EXERCISE

Fill in the blanks with your responses. Answers are provided on page 15.

1. A bathtub has a P-trap stoppage. To get to the stoppage, the \_\_\_\_\_ and \_\_\_\_\_ are removed.
2. To clear a bathtub's P-trap stoppage, the drain snake is pushed into the \_\_\_\_\_.
3. A bathtub with a drum trap has a stoppage. To get to the stoppage, the \_\_\_\_\_ and \_\_\_\_\_ are removed.
4. To clear a drum trap stoppage, the drain snake is pushed into the \_\_\_\_\_ pipe first.

**Clearing a shower floor drain stoppage with a hose. (See figure 11.)**



Remove the strainer.

Hook up a hose for a water source where possible.

Place the other end of the hose into the shower drain.

Stuff large rags around the hose to form a tight seal.

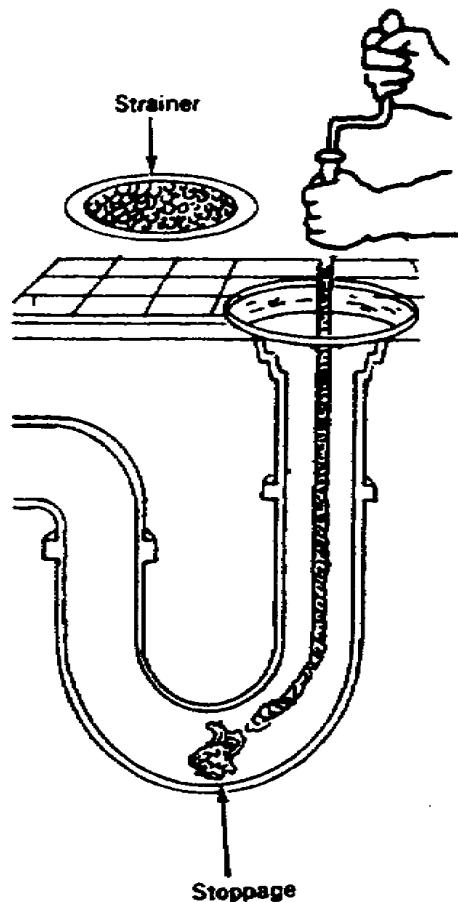
Turn water on full force, off and on again. The surge of water will clear the stoppage.

Remove the rags and run water down the drain to make sure the stoppage is cleared.

Replace the strainer.

Clearing a shower floor drain stoppage with a drain snake. (See figure 12.)

FIGURE 12. DRAIN SNAKE METHOD



Remove the strainer.

Push a snake into the drain opening until it meets resistance.

Turn the handle in a clockwise direction, pushing and pulling the snake until it moves freely in the drain. Remove the snake.

Run water into the drain to make sure the stoppage is cleared.

Replace the strainer.

**NOTE:** A floor drain stoppage is cleared in the same manner.

## Lesson 1/Learning Event 2

### SELF-CHECK EXERCISE

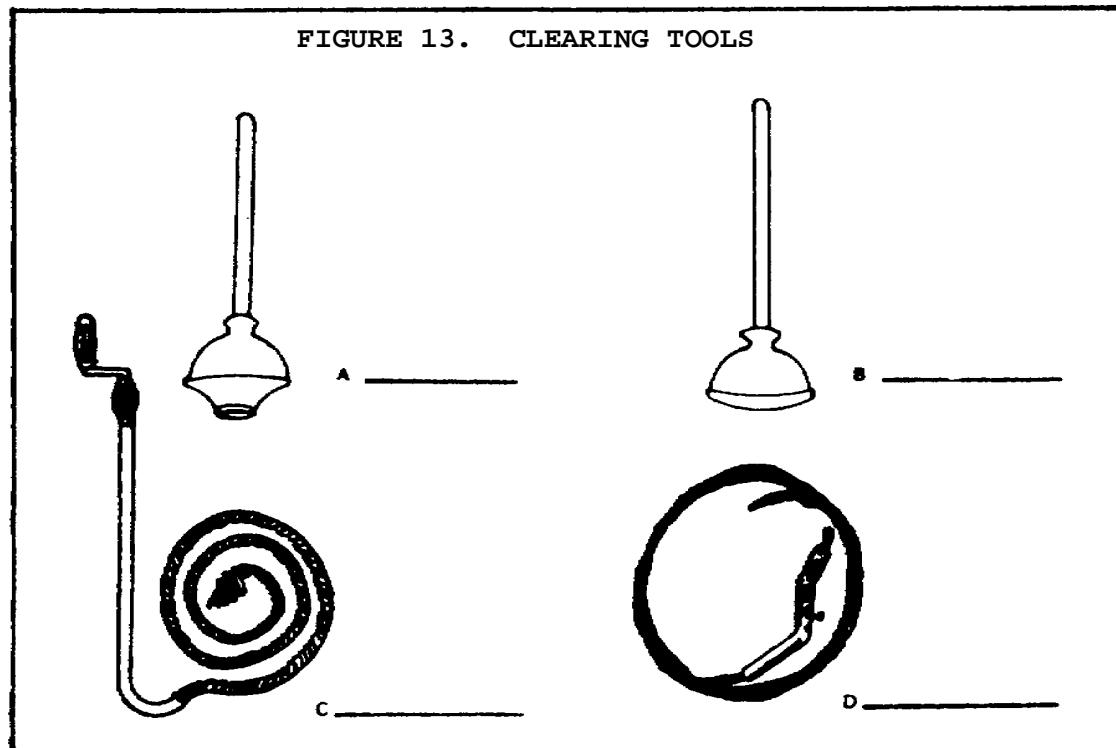
Fill in the blank with your response. Answers are provided on page 16.

1. A shower drain stoppage can be cleared by using a \_\_\_\_\_ or a \_\_\_\_\_.
2. When the stoppage is to be cleared with a water hose, the drain is sealed with \_\_\_\_\_.
3. When using a snake to clear the floor drain stoppage, the snake is turned in a \_\_\_\_\_ direction.

### Lesson 1 REVIEW EXERCISE

Check your understanding of Lesson 1 by completing these review exercises. Try to complete all of the exercises without looking back at the lesson. When you are finished, turn to the solutions at the end of the lesson and check your responses. If you missed any, go back and restudy the place in the lesson where the information is given.

1. Identify each stoppage clearing tool. (See figure 13.)



**Lesson 1/Learning Event 2**

2. When you remove a lavatory's stoppage with a plunger, what is placed in the overflow opening? \_\_\_\_\_.
3. If the lavatory's stoppage is in the drain line going to the wall, what is removed before using a drain snake? \_\_\_\_\_.
4. What type of plunger should be used to clear a water closet's stoppage?  
\_\_\_\_\_.
5. A stoppage in a water closet can be cleared with what other type of clearing tool? \_\_\_\_\_.
6. A stoppage in a urinal with a water seal trap is cleared with what type of plunger? \_\_\_\_\_.
7. A bathtub with a P-trap has a stoppage. To clear the stoppage, into what opening is a drain snake placed? \_\_\_\_\_.
8. A bathtub with a drum trap has a stoppage. To clear the stoppage, into which drain pipe is the drain snake placed first? \_\_\_\_\_.
9. When a shower's floor drain stoppage is being cleared using a water hose, what must be placed around the hose at the drain opening? \_\_\_\_\_.
10. In what direction is a drain snake turned to clear a shower's floor drain stoppage? \_\_\_\_\_.

---

**SELF-CHECK EXERCISE SOLUTIONS**

1. Popup stopper and overflow cover
2. Overflow opening
3. Cover and gasket
4. Lower



## Lesson 1/Learning Event 2

### SELF-CHECK EXERCISE SOLUTIONS

1. Water hose or a drain snake
2. Rag
3. Clockwise

### REVIEW EXERCISE SOLUTIONS

1. A. Plunger, cone (page 2)  
B. Plunger, plain  
C. Water closet auger  
D. Drain snake
2. Wet cloth (page 3)
3. P-trap (page 5)
4. Cone (page 6)
5. Water closet auger (page 7)
6. Cone (page 9)
7. Overflow (page 10)
8. Lower pipe (page 11)
9. Rags (page 12)
10. Clockwise (page 13)

**Lesson 2**  
**CLEAR STOPPAGES IN WASTE LINES**

**OBJECTIVE**

At the end of this lesson, you will be able to describe the procedures used to clear stoppages in floor drains and buildings' main waste drains.

**TASK**

051-248-1012, Clear waste system stoppages.

**CONDITIONS**

You will be given subcourse booklet. You will work at your own pace and in your own selected environment with no supervision.

**STANDARDS**

Within approximately 3 hours, you should be able to study the lesson resources, answer the review exercises, and select the correct response to each examination question. You must respond correctly to 70 percent of the examination questions in order to receive credit for this subcourse.

**REFERENCES**

FM 5-51K1/2

TM 5-551K

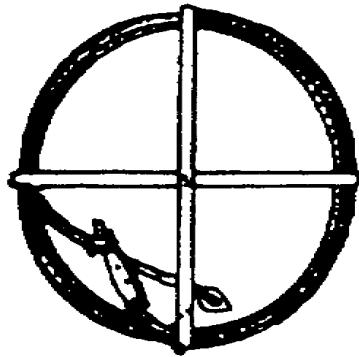
## Lesson 2/Learning Event 1

### Lesson 2

#### Learning Event 1: IDENTIFYING SEWER SNAKES

When waste disposal backs up into two or more fixtures, it means that a stoppage lies somewhere in a branch waste line or a main waste line. The stoppage has to be located and cleared. Stoppage clearing tools for a branch and main line are shown in figure 14.

FIGURE 14. SEWER SNAKES



Heavy duty snake - use for main line  
3/4" to 1"



Drain snake - use for branch line  
1/4" to 1/2"

Note Electrical powered heavy duty snake  
can also be used on mainline

Use 1/4- to 1/2-inch drain snake for branch line.

Use 3/4- to 1-inch heavy duty snake for main line.

**NOTE:** Electrical powered heavy duty snake can also be used on a main line.

#### SELF-CHECK EXERCISE

Fill in the blanks with your responses. Answers are provided on page 20.

1. A \_\_\_\_\_ is used to clear a stoppage in a branch line.
2. A \_\_\_\_\_ is used to clear a stoppage in a main line.

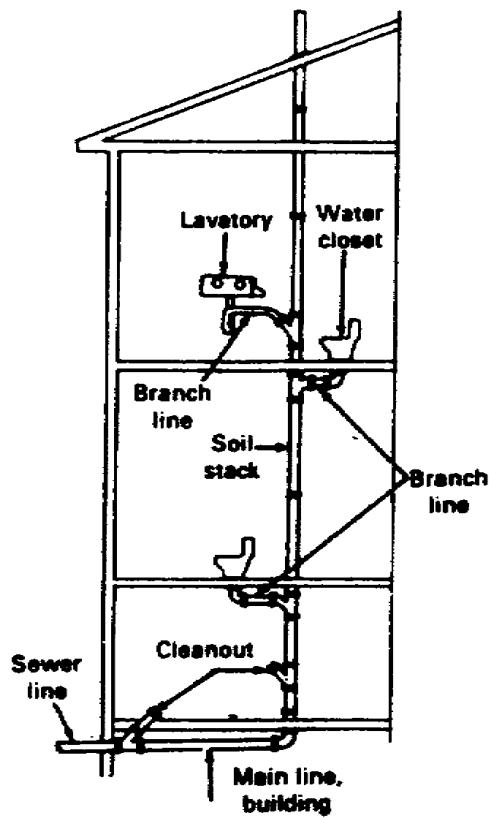
## Learning Event 2:

## LOCATING AND CLEARING STOPPAGES IN WASTE LINES

A lot of your time as a plumber will be spent in clearing stoppages in waste lines. When trouble arises, you must perform the proper maintenance required to correct the trouble without damaging the system.

Locating a stoppage in a branch and main waste line. (See figure 16.)

FIGURE 15. BRANCH AND MAIN WASTE LINES



If the lavatory has a stoppage and the water closet drains properly, the stoppage is in the lavatory's branch line.

If the water closet has a stoppage and the lavatory drains properly, the stoppage is in the water closet's branch line.

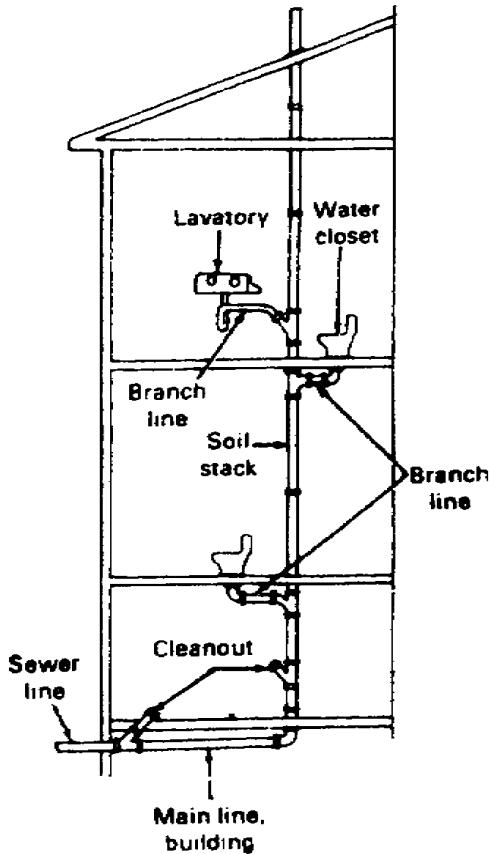
If the lower water closet has a stoppage and the lavatory and upper water closet drain properly, the stoppage is in the lower water closet in the branch line.

If all the fixtures have a stoppage, the stoppage is in the main line or possibly in the sewer line.

**SELF-CHECK EXERCISE**

Use figure 16 to respond to questions 1 and 2. Answers are provided on page 22.

1. If the lavatory has a stoppage and the water closet flushes properly, where is the stoppage located?
2. If all the fixtures are stopped up, where is the stoppage located?

**FIGURE 16. BRANCH AND MAIN WASTE LINES**

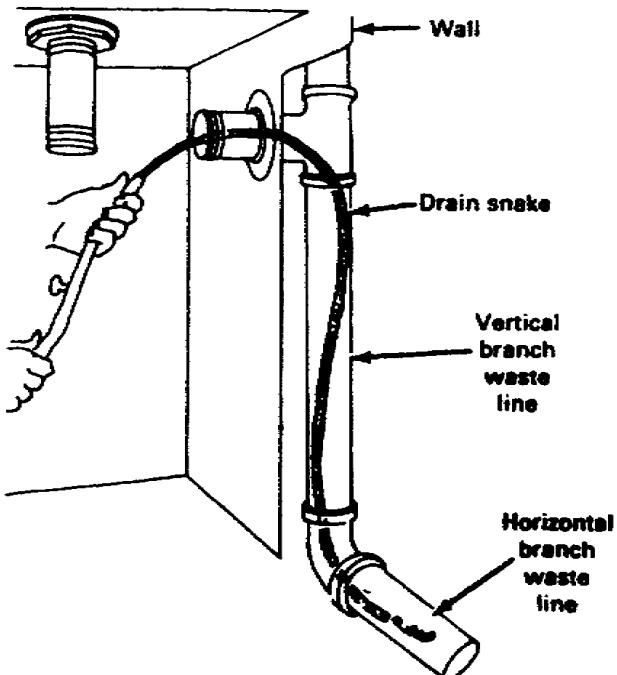
---

**SELF-CHECK EXERCISE SOLUTIONS**

1. Drain snake
2. Heavy duty snake

Clearing a branch line stoppage in a lavatory/sink. (See figures 17 and 18.)

FIGURE 17. CLEARING A LAVATORY/SINK



Turn off the water supply at the shutoff valve.

Remove the P-trap from the tall piece to the drain outlet at the wall.

Push a drain snake into the drain outlet until resistance is met. Turn the drain snake in a clockwise direction pushing and pulling at the same time to clear the stoppage.

Remove the snake and replace the P-trap.

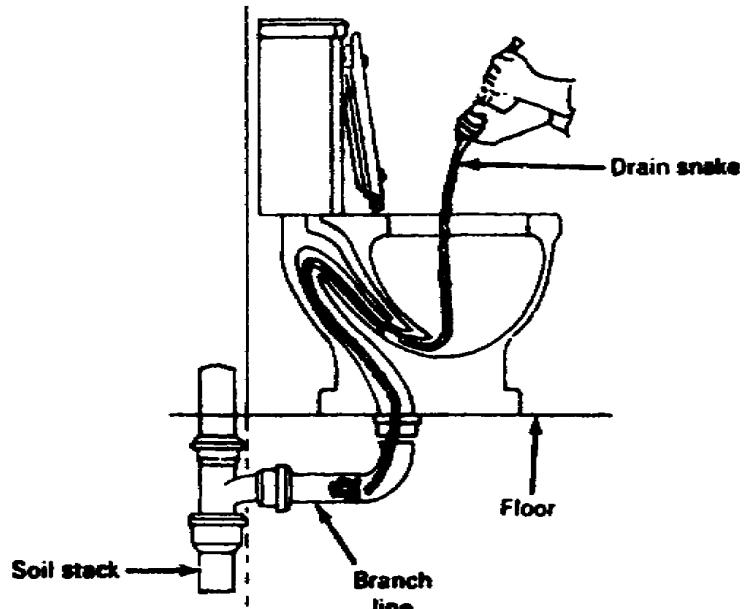
Turn on the water supply at the shutoff valves.

Run water into the lavatory/sink to assure that the stoppage has been cleared.

Lesson 2/Learning Event 2

Clearing a branch line stoppage in a water closet. (See figure 18)

FIGURE 18. CLEARING A WATER CLOSET



Turn off the water supply at the shutoff valve.

Push a drain snake into the water closet as far as it will go.

Turn the drain snake in a clockwise direction pushing at the same time to clear the stoppage.

Turn on the water supply at the shutoff valves.

Flush the water closet to be sure that the stoppage has been cleared.

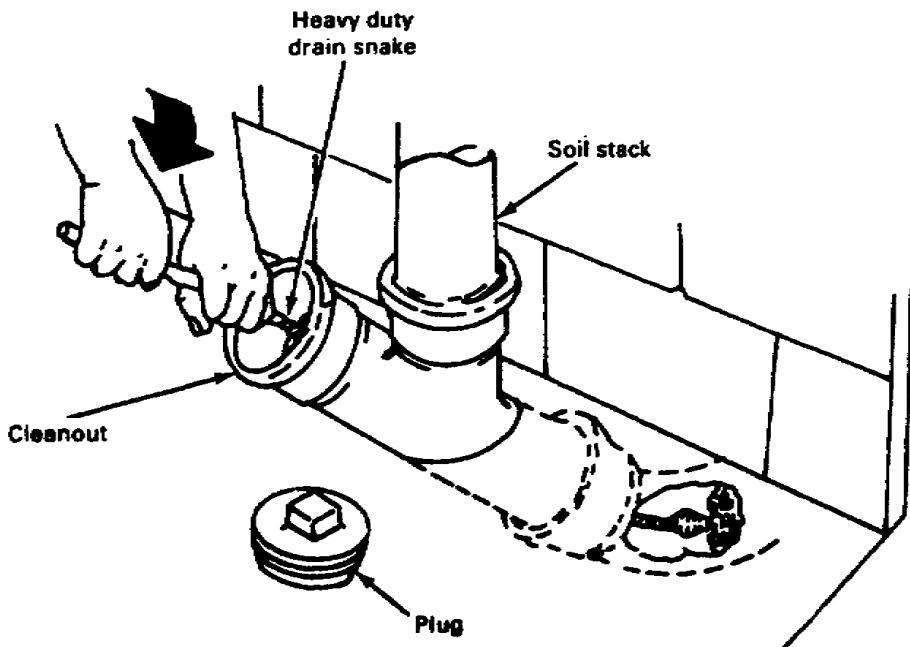
---

SELF-CHECK EXERCISE SOLUTIONS

1. Branch line lavatory
2. Main line, building

Clearing a main waste line stoppage. (See figure 19.)

FIGURE 19. CLEARING A MAIN WASTE LINE



Locate the cleanout at the base of the soil stack.

Remove the cleanout plug with a wrench.

Push a heavy duty snake into the cleanout opening until resistance is met.

Turn the snake in a clockwise direction pushing at the same time to clear the stoppage.

Remove the snake and replace the cleanout plug.

Run water into the main line to assure the stoppage has been cleared.

**NOTE:** For a sewer line stoppage, locate its cleanout and follow the same method as for a main waste line.

## Lesson 2/Learning Event 2

### SELF-CHECK EXERCISE

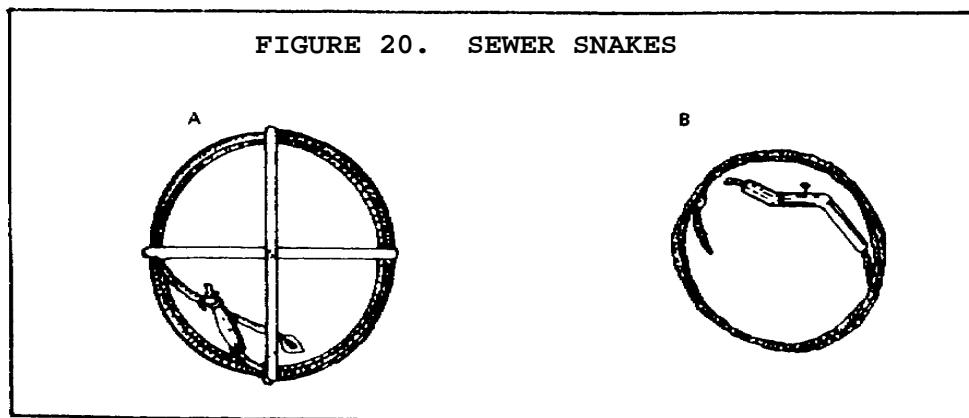
Answers are provided on page 26.

1. To clear a stoppage in a lavatory's horizontal branch line behind a wall with a drain snake, which part of the lavatory's drain is removed?
  - A. Tailpiece
  - B. Strainer
  - C. P-trap
  - D. Drain flange
2. To clear a stoppage in a water closet's horizontal branch line with a drain snake, what is the snake placed through?
  - A. Soil stack
  - B. Water closet bowl
  - C. P-trap
  - D. Water seal
3. The cleanout at the base of the soil stack is used to clear a stoppage in the \_\_\_\_\_.

### Lesson 2 REVIEW EXERCISE

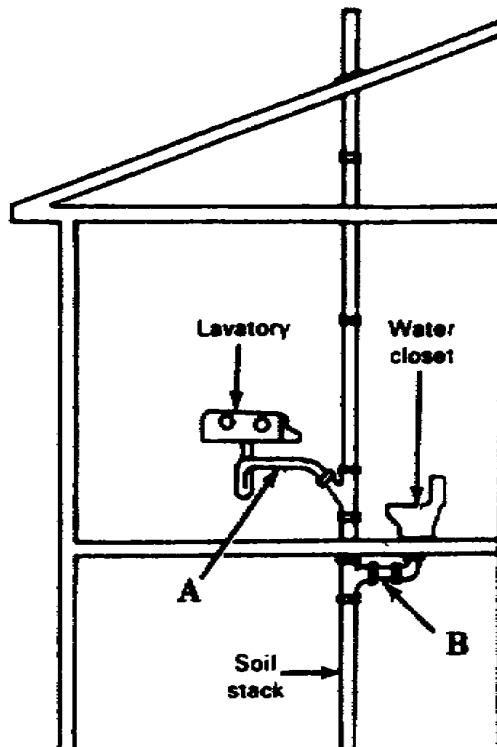
Check your understanding of Lesson 2 by completing these review exercises. Try to complete all of the exercises without looking back at the lesson. When you are finished, turn to the solutions at the end of the lesson and check your responses. If you missed any, go back and restudy the place in the lesson where the information is given. Use figure 20 to answer questions 1 and 2.

1. Which snake is used to clear branch line stoppages?
2. Which snake is used to clear main line stoppages?



3. See figure 21. If the water closet has a stoppage and the lavatory drains properly, where is the stoppage located?

FIGURE 21. BRANCH AND MAIN LINES



Fill in the blanks with your responses.

4. The \_\_\_\_\_ must be removed to clear a stoppage in a lavatory's branch line
5. A stoppage in the branch line of a water closet is cleared using a \_\_\_\_\_.
6. The cleanout at the base of the soil stack is used to clear a stoppage in the \_\_\_\_\_.

## Lesson 2/Learning Event 2

---

### SELF-CHECK EXERCISE SOLUTIONS

1. P-trap
2. Water closet bowl
3. Main line

---

### REVIEW EXERCISE SOLUTIONS

1. B. Drain snake (page 18)
2. A. Heavy duty snake (page 18)
3. B. Branch line of water closet (page 19)
4. P-trap (page 21)
5. Drain snake (page 22)
6. Man line (page 23)